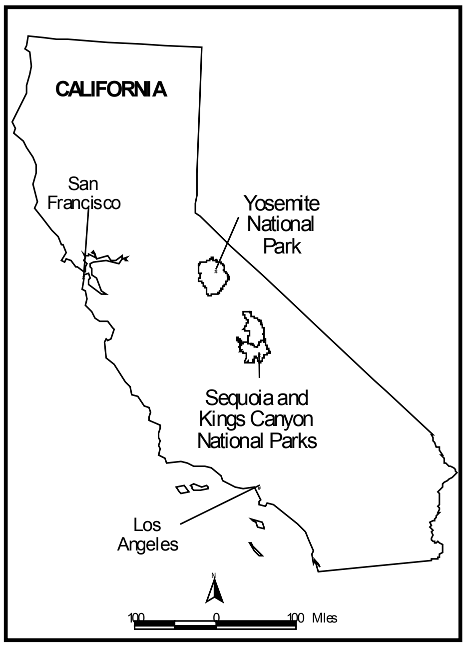
4 Affected Environment

OVERVIEW

Figure 4-1 – California Map



Sequoia and Kings Canyon National Parks are located in the eastern part of central California. Park headquarters at Ash Mountain is located 175 air miles (282 km) north of Los Angeles and 215 air miles (346 km) southeast of San Francisco (see Figure 4- 1). Both parks occupy the western slope of the Sierra Nevada, the four- hundred- mile- long (640- km) mountain range that forms the eastern edge of the California biological and cultural province. Combined acreage for the two parks is 865,257 acres (350,165 ha).

Sequoia and Kings Canyon are two separate national parks that were created by acts of Congress fifty years apart. Established September 25, 1890, Sequoia National Park is the second oldest national park in the United States. On October 1, 1890 Congress created the four- square- mile General Grant National Park to protect the General Grant Tree and surrounding forest. In 1940 Congress created Kings Canyon National Park. In addition to incorporating the four square miles of General Grant National Park and several other sequoia groves, the new Kings Canyon National Park also featured glacial canyons and alpine headwaters of the South and Middle Forks of the Kings River. Over time and up to the present, the parks have undergone substantial boundary changes and have increased in size. Today these parks are administered as a single unit.

Kings Canyon is the northern of the two parks and consists of two sections containing 5 giant sequoia groves. The small, detached General Grant Grove section of Kings Canyon National Park preserves several groves of giant sequoia including the General Grant Grove and the Redwood Canyon/ Redwood Mountain Grove, one of the largest remaining natural giant sequoia groves in the world. This section of the park is mostly mixed conifer forest, and is readily accessible via paved highways. Grant Grove is surrounded on three sides by Giant Sequoia National Monument, managed by the United States Forest Service.

The remainder of Kings Canyon National Park, which comprises over 90% of the total acreage, is located east of General Grant Grove in the subalpine and alpine region. This area forms the headwaters of the South and Middle Forks of the Kings River and the South Fork of the San Joaquin River. One portion of the South Fork canyon, known as the Kings Canyon, gives the park its name. The Kings Canyon, and its sole developed area, Cedar Grove, is the only portion of the main part of the park that is accessible by motor vehicle. The high country is accessible via rugged foot and horse trails that are usually snow free from late June until late October. The Sierra crest forms the eastern boundary of the park. Ninety- six (96%) of Kings Canyon National Park is designated wilderness.

Sequoia National Park lies south of Kings Canyon and adjoins it. The park consists of a single unit that rises from the low western foothills to the crest of the Sierra at 14,495- foot- high (4,418- m) Mt. Whitney, the highest point in the 48 contiguous states. The western third of the park is dominated by two natural regions – a zone of foothill vegetation below 5,000 feet (1,524 m), and an extensive band of mixed- conifer forest between 5,000 and 9,000 feet (1,524- 2,743 m). The mixed conifer forest contains 34 separate giant sequoia groves, including the Giant Forest grove, which covers three square miles and contains the world's largest tree – the General Sherman. Both the Generals Highway and the Mineral King Road provide vehicular access to this western third of the park. Immediately east of the forest belt is the Great Western Divide, a north- south ridge that runs through the middle of Sequoia National Park. Peaks in the vicinity of the Divide rise as high as 13,802 feet (4,207 m).

The eastern half of the park consists of the alpine headwaters of the Kern River, the glacial trench of Kern Canyon and the Sierra Crest itself, which runs north- south and forms the eastern boundary of the park. All of this area, which comprises approximately two- thirds of Sequoia National Park, is designated wilderness.

US Forest Service wilderness (72%), the Giant Sequoia National Monument (16%), and Bureau of Land Management (BLM) lands (7%) share a total of ninety- five percent of the parks' boundary. An additional 4.6% of lands adjacent to the parks' boundary are privately owned and less than 1% are managed by the state.

NATURAL RESOURCE VALUES

Sequoia and Kings Canyon National Parks contain resources of geological, biological, and cultural value. In addition to holding national park status, the two reservations are designated as International Biosphere Preserves. Eighty- five percent of the parklands are in designated wilderness with another 12% in proposed wilderness. The remaining 3% of parklands are dedicated to administrative and visitor developments such as campgrounds, scenic roads, picnic areas, and overnight lodging. Both the Kern River and the middle and south forks of the Kings River are designated as Wild and Scenic Rivers.

Geological resources include river- cut canyons more than a mile deep, extensive and spectacular examples of glacial erosion including hundreds of alpine lakes, and several superlative examples of glacially eroded canyons. Within these canyons flow the largest remaining undammed rivers in the Sierra Nevada. Igneous rocks of Mesozoic origins underlie the majority of the two parks, but extensive bands of Paleozoic metamorphic beds also occur. Within the latter, beds of marble are common, as are caves.

Congress created Sequoia and General Grant National Parks in 1890 expressly to protect the giant sequoia. The General Sherman Tree, growing in Sequoia National Park's Giant Forest, is generally recognized as the largest sequoia and the largest living tree on earth. Three other trees in the Giant Forest and the General Grant Tree in Kings Canyon National Park complete the list of the world's five largest trees.

Sequoia trees do not grow continuously through the mixed conifer forest belt, but rather in geographically limited areas called groves. In the Sierra Nevada, the only present natural home of the sequoias, the trees grow in fewer than 90 separate groves. The two parks together contain roughly 33% of all naturally occurring sequoia grove acres.

The biological resources of the two parks are not limited to the sequoias. Extensive tracts of Sierran mixed conifer forest surround the sequoia groves. This forest belt, which generally clothes the mountains at altitudes between 5,000 and 9,000 feet (1,524 and 2,743 m), covers much of the southern Sierra. The parks contain the largest remaining old growth forest in the southern Sierra. Below the conifer forest, in the western portions of the Sierra, are the various plant communities and environments that together constitute the foothill region. This environment is typified by blue oak savanna, chaparral, and oak woodland.

The remainder of the parks, most of it above 9,000 feet (2,743 m) in altitude, can be described as "High Sierra." This environment is a spectacular land of rugged, ice- sculptured alpine ridges and sparsely wooded lake basins.

The preservation of native wildlife within the two parks results naturally from habitat protection and maintenance. While the wildlife found within the parks does not differ significantly from that found naturally on surrounding lands, those lands are undergoing profound change. As a result, the wildlife protection function of the parks is becoming increasingly important.

CULTURAL RESOURCE VALUES

In addition to their natural diversity the parks preserve a rich, unique cultural record of prehistoric and historic sites. It is estimated that five percent (5%) of the parks' collective acreage has been inventoried (surveyed) for the presence/absence of cultural resources. This figure translates into approximately 43,000 acres.

In general, the parks' known cultural resources span a time period of at least 3- 5,000 years. These resources document prehistoric, ethnographic, historic, and even contemporary use of park areas. They include permanent bedrock mortars (grinding holes) log or lumber structures, rock art sites, expansive vistas, and wild plant resources visited discretely by contemporary Native Americans for spiritual or cultural purposes.

The earliest systematic inventories of cultural resources date from the late 1950s and early 1960s. Previous investigations, including interviews with Native Americans and early settlers, were infrequently conducted and tended to focus on the most highly visible sites and included extrapolations of knowledge from outside the parks. The compliance inventories of the mid-1960s to the 1990s have expanded the database of known cultural resources within the parks to 312 prehistoric sites, 110 historic sites, and 169 site leads. This database represents the best available information on the range of site types and human activities carried out over time in the parks. (See Appendix D for the National Register listing.)

Prehistoric Resources

Prehistoric cultural resources are those human- made sites, structures, features, or objects that pre- date the arrival of Euroamericans. By definition, these resources are synonymous with Native American or American Indian use. At the time of the first Spanish movements into the Great Central Valley of California (circa 1800), the native groups living in the valley and the western foothills of the Sierra Nevada were the Yokuts and Monache Indians (a.k.a. Western Mono). Prehistoric site types within the parks include small villages, lithic scatters (marking areas of stone tool production or use such as campsites), midden soils, bedrock mortars and basins, caves, stone circles and hunting blinds, pictographs, and petroglyphs.

Ethnographic Resources

Ethnographic resources are recognized as including combinations of natural resources and standard cultural resource types. The distinction traditionally made by agency managers between natural and cultural resources may not apply when focusing on ethnographic resources. These latter resource types can be locales where subsistence or religious (ceremonial) activities are conducted, by either groups or individuals, and include associated sites, structures, objects, and landscapes that are assigned cultural significance by traditional users. Ethnographic resources within the parks can include such things as the sites of historic villages or campsites, caves, rock art sites, traditional plant gathering areas, graves, landscapes, vistas, and other natural features (e.g., monoliths and promontories).

Historic Resources

Historic resources are those human- made sites, structures, features, or objects that date from the time of the arrival of Euroamericans in approximately 1850, up until the middle of the 20th century (i.e., at least 50 years of age). Historic sites, by definition then, can be of Native American association but are most often associated with Euroamerican use and occupation. Aspects of all of the episodes of historic activity can be found in historic sites in the parks. The associated site types include cattle camps, trails, sawmills, logging camps, stumps, shake piles, mines, trash dumps, hydroelectric dams and water flumes, the Colony Mill Road, military campsites, Civilian Conservation Corps- era ranger stations and roads, and post- World War II homes.

CURRENT CONDITIONS

Extensive fire history studies show that most vegetation communities in the parks evolved and adapted under the influence of fire. Lower and mid elevation vegetation communities, including giant sequoia groves, have been subject to frequent lightning- ignited fires (every 6- 17 years) over millennia.

Between 1891 and 1967, the parks attempted to suppress all fires, and met with a fair degree of success. Consequently, several park vegetation communities that evolved in the presence of frequent fires have experienced an unprecedented period without fire (Caprio and Graber, 2000). This lack of fire has resulted in important ecosystem changes. In the foothill grasslands, lack of fire encourages dominance by exotic grasses (Parsons and Stohlgren 1989). Additionally, due to a buildup of dense vegetation along foothill streams and in their upper catchments, lack of fire apparently has reduced annual streamflow in the foothills, probably to the detriment of aquatic communities. In foothill chaparral, richness of fire- dependent chaparral species seems to be unusually low following prescribed fires, perhaps due to the exhaustion of the soil seed bank during the long preceding fire- free period (Keeley 2000).

The consequences of fire exclusion have best been characterized by research in the mixed conifer zone. Both stream chemistry (Williams and Melack 1997) and stream flow (Moore 2000) in the mixed conifer zone have been altered by the lack of fire, with unknown consequence for aquatic ecosystems. Giant sequoia reproduction, which in the past depended on frequent fires to expose mineral soil and open gaps in the forest canopy, had effectively ceased by 1967, and reproduction of other shade- intolerant species such as ponderosa pine has been reduced (Harvey et al. 1980, Stephenson 1994). Today more area is dominated by dense intermediate-aged forest patches, and less by young patches, than in the past (Bonnicksen and Stone 1978, 1982, Stephenson 1996). Forests have become denser in many areas, with increased dominance of shade- tolerant species. Shrubs and herbaceous plants are probably less abundant than in the past (Kilgore and Biswell 1971, Harvey et al. 1980). Perhaps most importantly, dead material has accumulated, causing an unprecedented buildup of surface fuels (Agee et al. 1978, van Wagtendonk 1985). Additionally, "ladder fuels" capable of conducting fire into the crowns of mature trees have increased (Kilgore and Sando 1975, Parsons and DeBenedetti 1979). One of the most immediate consequences of these changes is an increased hazard of wildfires sweeping through the mixed conifer forests with a severity that was rarely encountered in pre-Euroamerican times (Kilgore and Sando 1975, Stephens 1995, 1998).

Landscape scale changes in the fire regime are characterized by the parks' *fire return interval departure* (FRID) analysis. This geographic information system based analysis assesses the ecological condition of all vegetation communities using deviations from the natural fire cycle as the indicator of change. In general, the further vegetation communities depart from their natural fire regimes the more unnatural conditions prevail and the higher the risk of catastrophic wildfire events. A full description of the FRID analysis can be found in Caprio et al (1997).

Results of the FRID analysis (Caprio and Graber 2000) indicate that 47% of park vegetation is considered to be in acceptable ecological condition (i.e. little to no deviation from natural fire regime) as of the year 2000. These areas are expected to remain in acceptable ecological condition as long as the natural fire regime is maintained. Another 30% of the park vegetation shows significant deviation from natural conditions, and over 22% of park acres are considered highly compromised by past fire suppression (see Figure 4- 2). Most of the deviation from natural conditions occurs in the lower to mid- elevation conifer forests, including giant sequoia groves. Despite ongoing reintroduction of fire to groves over the past 30 years, progress has been slow with 57% of grove acres still in a highly compromised state. The analysis does show positive effects of the past proactive fire management on returning many acres to acceptable condition, but also underscores the extent of areas requiring attention.

Lack of fire has also reduced habitat critical for certain wildlife species. In the absence of fire, the number and extent of forest openings has been reduced, with an accompanying reduction of key herbaceous and shrub species (particularly nitrogen fixers such as *Ceanothus*) (Bonnicksen and Stone, 1982). Wildlife that depends on these plants, such as deer, now has less available habitat. Black- backed woodpeckers have probably declined in the absence of fresh fire- created snags. The effects of fire exclusion also can extend to higher trophic levels. For example, rodents are less abundant in areas within these parks where fire has been excluded (Werner, 1997), almost certainly leading to a reduction in the carnivore populations that depend on them. Current unnatural fuel loads and vegetation densities have significant implications for the management of cultural resources. These include increased risk of direct damage to cultural resources from high intensity wildfire events, and from the emergency response operations necessary to manage such fires. Current conditions may also increase the risk of damage from indirect effects of large high intensity fires, such as increased erosion of soils containing surface and subsurface resources. Overly dense vegetation and fuel loads pose other challenges to pro-active management of cultural resources by making the detection and evaluation of potential cultural sites difficult in many areas of the parks. Beginning in 1968, the parks recognized the importance of fire in the parks' ecosystems and the increasing threat to cultural resources and public safety from the buildup of fuels. In that year the parks began a prescribed fire and wildland fire use program. However, after more than 30 years of proactive fire management, the parks still are far from restoring natural fire regimes to the entire park landscape, though significant inroads have been made (Caprio and Graber, 2000).

Figure 4-2 – Fire Return Interval Departure Map

The colors on this map correspond to the number of fire cycles, or fire return intervals, an area has missed. Red areas have missed 5 to 17 intervals, whereas green areas are within their natural range and have not missed a fire return interval. For more information, see Figure 4-2 in the companion *Fire and Fuels Management Plan*.